General information

Wellbore name	2/4-8
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	TOR
Discovery	2/5-1 Tor
Well name	2/4-8
Seismic location	AFE NW 5603
Production licence	018
Drilling operator	Phillips Petroleum Company Norway
Drill permit	63-L
Drilling facility	ZAPATA EXPLORER
Drilling days	124
Entered date	25.11.1971
Completed date	29.03.1972
Release date	29.03.1974
Publication date	02.04.2007
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	PALEOCENE
1st level with HC, formation	EKOFISK FM
2nd level with HC, age	LATE CRETACEOUS
2nd level with HC, formation	TOR FM
Kelly bushing elevation [m]	37.0
Water depth [m]	66.0
Total depth (MD) [m RKB]	4075.0
Maximum inclination [°]	1.75
Bottom hole temperature [°C]	128
Oldest penetrated age	LATE PERMIAN
Oldest penetrated formation	ZECHSTEIN GP
Geodetic datum	ED50
NS degrees	56° 38' 15.6'' N
EW degrees	3° 18' 55'' E
NS UTM [m]	6277238.17

EW UTM [m]	519339.11
UTM zone	31
NPDID wellbore	252

Wellbore history

General

Well 2/4-8 was drilled on the crest of the Tor Discovery structure in the southern Norwegian North Sea. The principal objective was to confirm the thick Danian-Cretaceous productive section present in the Amoco 2/5-1 well and to provide a means of evaluating the maximum anticipated productive section in the Tor Discovery. Jurassic sandstone was also defined as principal objective, while secondary prospects could exist in Paleocene sands. Prognosed top Jurassic was at 3691 m (12110 ft) with planned TD at 4572 m (15000 ft).

Operations and results

Appraisal well 2/4-8 was spudded with the jack-up installation Zapata Explorer on 25 November 1971. The original spud location was 56 deg 38' 15.6'' N, 03 deg 18' 48'' E. This hole was drilled to 570 m at which point the well kicked and bridged off. The drill pipe became stuck at 486 m and the hole was abandoned with the top of fish at 323 m. The rig was moved 120 meters east where the well was re-spudded and drilled to final TD at 4078 m in the Permian Zechstein Group. The well was drilled with seawater and hi-vis mud down to 488 m, with drill aid / DAP (di-ammonium phosphate) mud from 488 m to 1623 m, with drill aid / gypsum mud from 1623 m to 2211 m, with drill aid from 2211 m to 2984 m, with a lignosulphonate mud from 2984 m to 3810 m, and with Drispac / salt saturated mud from 3810 m to TD. Below 488 m 2 -6 % diesel was added to the mud.

At 2946 m the well penetrated a 3 m fine grained Paleocene sand with a calcite matrix. This sandstone exhibited a dull yellow fluorescence and a slow cut. Danian chalk was encountered at 2985 m and Late Cretaceous chalk was encountered at 3086 m. Gas and oil was tested from the Danian - Late Cretaceous chalk. Continuous zones of oil shows were observed on all cores down to 3203 m, below this depth shows were scattered.

Twenty cores with a total recovery of 176 m core were cut in the interval 2985 to 3242 m in Danian and Late Cretaceous chalk. No wire line fluid samples were taken.

The well was permanently abandoned on 29 March 1972 as an oil appraisal.

Testing

Seven drill stem tests were carried out through perforations in the 7'' liner. Two of these were carried out in the Danian chalk (DST 6 and DST 7), the rest in the Late Cretaceous chalk. DST 1 and DST 2 were conducted without acidization and flowed only minor quantities of water. The other DST's flowed oil after acidization. The best flow was obtained in DST 5 from the interval 3091 - 3158 m in the uppermost Late Cretaceous with 655 Sm3 oil /day. The oil gravity was 40.4 deg API and the GOR was 359 Sm3/Sm3.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
487.68	4075.18

Cuttings available for sampling?	YES

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	9795.0	9806.0	[ft]
2	9820.0	9846.0	[ft]
3	9852.0	9873.0	[ft]
4	9873.0	9891.0	[ft]
5	9913.0	9921.0	[ft]
6	9921.0	9953.0	[ft]
7	9959.0	9978.0	[ft]
8	9980.0	10007.0	[ft]
9	10007.0	10031.0	[ft]
10	10033.0	10092.5	[ft]
11	10094.0	10154.0	[ft]
12	10155.0	10190.0	[ft]
13	10197.0	10204.0	[ft]
14	10258.0	10269.0	[ft]
15	10270.0	10331.0	[ft]
16	10331.0	10392.0	[ft]
17	10392.0	10453.0	[ft]
18	10453.0	10514.0	[ft]
19	10514.0	10575.0	[ft]
20	10575.0	10653.0	[ft]

Total core sample length [m]	226.0
Cores available for sampling?	YES

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
3668.3	[m]	DC	HRS
3676.0	[m]	DC	HRS
3682.0	[m]	DC	HRS
3693.0	[m]	DC	HRS

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
103	NORDLAND GP
1716	HORDALAND GP
2882	ROGALAND GP
2882	BALDER FM
2893	SELE FM
2920	LISTA FM
2974	VÅLE FM
2985	SHETLAND GP
2985	EKOFISK FM
3086	TOR FM
3383	HOD FM
3444	BLODØKS FM
3460	HIDRA FM
3484	CROMER KNOLL GP
3484	RØDBY FM
3677	TYNE GP
3677	MANDAL FM
3696	ZECHSTEIN GP

Geochemical information

Document name	Document format	Document size [MB]
252_1	pdf	1.14
252_2	pdf	0.93
252_3	pdf	2.06

Documents - older Norwegian Offshore Directorate WDSS reports and other related documents

Document name	Document format	Document size [MB]
252_01_WDSS_General_Information	pdf	0.41

Documents - reported by the production licence (period for duty of secrecy expired)

Document name	Document format	Document size [MB]
252_01_2_4_8 (8AX)_Completion_Report_and_Completion_log	pdf	33.89
252_02_2_4_8 (8AX)_Individual_Well_Completion_Record	pdf	0.09
252_03_2_4_8 (8AX) A Study of the Natural Fracture System	pdf	6.71
252_03_2_4_8 (8AX) Lithostratigraphy Sedimentology	pdf	163.61
252_03_2_4_8 (8X) Biostratigraphy and Paleoe	pdf	0.65
252_03_2_4_8 (8X) Biostratigraphy of Core Samples	pdf	1.37
252_03_2_4_8 (8X) The Micropaleontology and Stratigraphy	pdf	2.78
252_03_2_4_8 Biostratigraphical_Summary_of_the_Lower_Cretace	pdf	0.17
252_03_2_4_8 Biostratigraphic Summary Diagram	pdf	26.95
252_03_2_4_8 Geochemical Analysis Report	pdf	13.36
252_04_2_4_8 (8AX)_Additional_Conventional_Core_Analysis	pdf	0.18
252_04_2_4_8(8AX)_Core_Analysis_Result	pdf	1.77
252_04_2_4_8 (8AX)_Core_Lithological_Descriptions	pdf	0.48
252_04_2_4_8 (8AX) Petrography of Selected Samples Danian	pdf	18.25
252_04_2_4_8 (8AX) Porosity Permeability and Grain Density	pdf	0.27
252_04_2_4_8 (8AX) Special Core Analysis Study	pdf	3.42
252_04_2_4_8 (8AX) XRD Analysis of Selected Samples	pdf	0.34
252_05_2_4_8(8AX) Capillary Pressure Gas-Oil_and_water-Oil	pdf	3.31
252_05_2_4_8 (8AX) DST Fluid and Samples Analysis	pdf	2.96
252_05_2_4_8 (8AX)_DST_Fluid_and_Sample_Analysis	pdf	16.40
252_05_2_4_8 (8AX) Formation Testing Service Report	pdf	1.32

252_05_2_4_8 (8AX)_Individual_Well_Production_Test	pdf	0.12

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3194	3204	0.0
2.0	3185	3194	0.0
3.0	3181	3191	12.4
4.0	3194	3204	25.4
5.0	3091	3158	6.3
6.0	3014	3042	11.1
7.0	2996	3002	0.0

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				
2.0				
3.0				
4.0				
5.0				
6.0				
7.0				

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0					
2.0					
3.0	443	707028	0.885		1596
4.0	175	326025	0.822		1863
5.0	654	1316502	0.821		2013
6.0	360	519480	0.820		1443
7.0	71	133906			1886

Logs

Log type	Log top depth [m]	Log bottom depth [m]
BHC C	1611	4076
CBL	1829	3700
DL	2980	3731
FDC	2980	3726
GR BHC	479	1619
GR N	244	607
GR N	2956	3703
IES	479	4076
ML MLL	2982	3677
SNP	2980	4076
TS	1372	3619
VELOCITY	479	3721

Casing and leak-off tests

Casing type	Casing diam. [inch]	Casing depth [m]	Hole diam. [inch]	Hole depth [m]	LOT/FIT mud eqv. [g/cm3]	Formation test type
CONDUCTOR	30	137.0	36	138.0	0.00	LOT
SURF.COND.	20	548.0	26	548.0	0.00	LOT
INTERM.	13 3/8	1615.0	17 1/2	1616.0	0.00	LOT
INTERM.	9 5/8	3002.0	12 1/4	3003.0	0.00	LOT
LINER	7	3692.0	8 1/2	4078.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
450	1.13			seawater	
945	1.25	54.0	28.0	seawater	
1229	1.62	48.0	10.0	seawater	
3577	1.71	44.0	21.0	Barite	
3710	1.75	44.0	11.0	Ligno	
4075	1.77	55.0	30.0	Ligno	